

RECEIVED
CENTRAL FAX CENTER
DEC 18 2006

REMARKS

Claims 1-6 and 9-33 are present in this application. Claims 7 and 8 are canceled. Claims 18-33 stand withdrawn. Claims previously amended are listed as previously presented even though they stand withdrawn. Claims 2, 12, 15, 16 28 and 29 are currently amended. Support is found in the claims as originally filed. Reconsideration of the application is requested.

The present invention is directed toward an organometal complex useful as a catalyst precursor. The catalyst precursor as defined in the instant claims comprises a selected Group -8, -9, or -10 transition metal, M; an ancillary bi-dentate ligand associated with M and comprising a substituted terminal amine and a substituted terminal phosphine connected by a hydrocarbyl bridge Y; and two abstractable ligands, X, bonded to the metal M in addition to the P-N containing ancillary ligand.

Objections to Abstract

The Abstract was previously amended according to the Examiner's suggestions. The Examiner now states that the abstract is objected to because it can easily accommodate the preferred structure of the catalyst system without exceeding the length limitations for an abstract. The Examiner cites MPEP § 608.01 (b) to support the objection. The abstract has been amended as the Examiner suggests. In the event the Examiner still objects to the Abstract, perhaps he could suggest the exact amendment he would like to see?

In view of the above, withdrawal of the objection is respectfully requested.

Rejections Under 35 U.S.C. § 112

Claims 1-6 and 9-17 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention.

Claim 1 has been canceled. Withdrawal of the rejection is requested.

The Examiner suggests that the recited ring of claim 2 is too strained to exist. It is respectfully submitted that the 3 membered ring as proposed in the instant claims are not too strained and can exist. The 3 membered ring would include the metal center. Note that the X atoms do also form a part of the ring. Further, Applicant notes that three membered metallacycle rings are well known in the literature, for example please see pages 60-61 of *Organotransition Metal Chemistry*, Akio Yamamoto, John Wiley and Sons, New York, 1986 (copy enclosed). Thus Applicant respectfully submits that the Examiner's suggestion that a three membered ring is too strained to exist is not correct and should not form the basis of a rejection under 35 USC § 112. Withdrawal of this rejection under 35 U.S.C. §112 is respectfully requested.

Claim 12 has been amended in the manner suggested by the Examiner. Withdrawal of this rejection is respectfully requested.

Claims 16 and 17 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The Examiner suggests that Claims 16 and 17 are inconsistent with claims 14 and 2. Claim 16 has been cancelled since its subject matter is covered in claim 1. Claim 17 has been currently amended to be dependent upon claim 1. In view of the amendment to 17 and the cancellation of claim 16 withdrawal of the rejection is respectfully requested.

Rejections Under 35 USC § 102(b)

It is noted that the only claim being rejected over prior art is claim 1. It is therefore assumed that the remainder of the claims would be allowable.

Claim 1 has been rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Buchwald et al. (U.S. Patent No. 6,307,087, hereinafter "Buchwald"). The Examiner suggests that the invention as claimed is anticipated when one reads the term "abstractable ligands" broadly citing column 7, lines 5 to 44 and column 31 lines 40 to column 32 line 32. This rejection is respectfully traversed.

Firstly, it is respectfully asked that the Examiner present a more detailed explanation of

Page 25 of 28

I:\Bpc\LA\Prosecution\EMCC Prosecution\2002\2002B130\US\2002B130-2 US\2002B130-2 Response to OA Dated 17 Aug 2006.doc

what is meant by "construing the term abstractable ligand broadly." It would appear from the nature of the Examiner's position that should the term "abstractable ligand" be more narrowly defined that the rejection would be removed. Further clarification is respectfully requested. The undersigned wishes to cooperate with the Examiner regarding this matter.

Secondly, it is respectfully submitted that Buchwald does not anticipate applicants' invention because Buchwald does not specifically disclose bridged complexed structures as instantly recited in Applicants' claims. More particularly, there is no disclosure within Buchwald that would represent the Applicants' composition that contains the abstractable ligands X. It is respectfully submitted that absent such a disclosure containing the transition metal bonded to the N and P atoms and further containing the abstractable ligands X, that Buchwald does not anticipate claim the claimed invention.

It should also be noted that Buchwald states that the metal should be in a zero oxidation state but not the highest oxidation state so that they are capable of undergoing oxidative addition. Applicants' metals such as Ni and Pd are Ni(II) and Pd(II), not the Ni(I) and Pd(0) of Buchwald. Withdrawal of the rejection is respectfully requested.

Applicant also notes that the Examiner has not responded to the arguments presented in the previous response. It was stated therein that: "The specific palladium and nickel complexes disclosed in Column 32 of Buchwald are not complexes which contain a bi-dentate aminophosphine ancillary ligand. (And applicants' claims exclude the Buchwald-disclosed palladium in any event.) Column 32 of Buchwald does say that bi-dentate ligands such as "hybrids of phosphine with amines" can be added as such to the Buchwald reaction mixture along with metal species to thereby form *in situ* the catalytic complexes of interest to Buchwald. But what ligands are formed on and remain on the eventually resulting catalytic metal complexes depends entirely on what ligands are present on the metal-ligand reagent added to the reaction mixture along with the aminophosphine ligand. There is no disclosure in Buchwald of any such specific metal-ligand reagent combined with any added specific aminophosphine bi-dentate ligand which would always and inevitably result in the formation of a catalyst precursor complex of the type

Page 26 of 28

L:\Bpc\LA\Prosecution\EMCC Prosecution\2002\2002B130\US\2002B130-2 US\2002B130-2 Response to OA Dated 17 Aug 2006.doc

encompassed by the structural formula set forth in applicants' Claims 1-6, and 9-17 as amended herein." It is asked that should this rejection over be Buchwald be maintained that the Examiner respond to the previously presented arguments.

It is respectfully submitted in view of the above that there is no disclosure in Buchwald of any specific catalyst precursor complex which would fall within the scope of the catalyst precursors now defined by the structural formula of applicants' amended claims.

In addition claim 1 has been canceled. Thus Applicant's respectfully request the rejection be withdrawn.

Possible Provisional Obviousness-Type Double Patenting

The Examiner has suggested the possibility of an obviousness-type double patenting rejection but has not set forth such a rejection. In any event, as previously suggested, Applicants respectfully disagree that the instant claims are obvious over the claims of 10/692,827 ('827). In particular, applicants note that Claim 2 in '827 is dependent on Claim 1 which requires an activator. The Examiner restricted catalyst/activator combinations in the instant application as a separate invention. Therefore applicants respectfully submit that under the Examiner's own logic, the instant claims are not subject to obviousness-type double patenting over '827.

Regarding the double patenting rejections, Applicants respectfully submit that, due to the still-changeable nature of the claims, these rejections should be held in abeyance, e.g., until such point as the pending claims are allowable but for such double patenting rejections. At that juncture, Applicants will, if necessary, submit the appropriate terminal disclaimer(s) to obviate any then-pending double patenting rejections. Applicants respectfully submit that these rejections are not ripe for resolution until there are otherwise allowable claims in the instant case and allowed or issued claims in the cases to which terminal disclaimers are sought.

Related Application

This application relates to similar subject matter in USSN 10/692,827, filed October 24,

2003. The Examiner is encouraged to review both applications in light of each other.

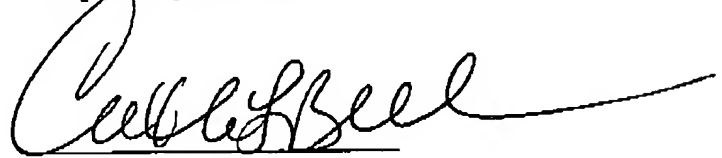
CONCLUSIONS

Applicants have made an earnest effort to place their application in proper form and to establish the patentability of their claimed invention over the applied prior art. WHEREFORE, reconsideration of this application, entry of the amendments, withdrawal of the art, rejoinder of the withdrawn claims, and allowance of the amended claims herein are all respectfully requested.

Please charge any deficiency in fees during the entire pendency of this application or credit any overpayments to Deposit Account No. 05-1712.

Any comments or questions concerning the application can be directed to the undersigned at the telephone number given below.

Respectfully submitted,



Catherine L. Bell
Attorney for Applicant
Registration No. 35,444

Date

Dec 18, 2006

ExxonMobil Chemical Company
Law Technology
P.O. Box 2149
Baytown, Texas 77522-2149
Phone: 281-834-5982
Fax: 281-834-2495

CLB:mk

Organotransition Metal Chemistry

Fundamental Concepts and Applications

AKIO YAMAMOTO

**Research Laboratory of Resources Utilization
Tokyo Institute of Technology
Yokohama, Japan**

A Wiley-Interscience Publication

JOHN WILEY & SONS

New York • Chichester • Brisbane • Toronto • Singapore

Copyright © 1986 by John Wiley & Sons, Inc.

All rights reserved. Published simultaneously in Canada.

Reproduction or translation of any part of this work beyond that permitted by Section 107 or 108 of the 1976 United States Copyright Act without the permission of the copyright owner is unlawful. Requests for permission or further information should be addressed to the Permissions Department, John Wiley & Sons, Inc.

Library of Congress Cataloging in Publication Data

Yamamoto, Akio, 1930-

Organotransition metal chemistry.

"A Wiley-Interscience publication."

Includes index.

1. Organometallic compounds. 2. Transition metal compounds. 1. Title.

QD411.Y36 1986 547'.05 85-26349

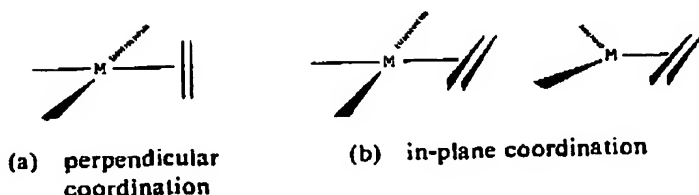
ISBN 0-471-89171-1

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

60

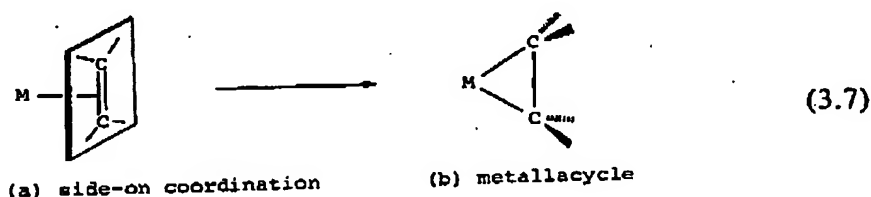
NATURE OF THE METAL-CARBON BOND



Which coordination mode is adopted is determined by the electronic and steric properties of the transition metal fragment and the coordinated olefin. In Zeise's salt, where ethylene is coordinated to d^8 Pt(II), perpendicular coordination is preferred, whereas in a d^{10} complex of Ni(0) such as $\text{Ni}(\text{C}_2\text{H}_4)_3$, in-plane coordination is favored. Rationales for the preferred coordination mode in these cases have been provided by semiempirical as well as *ab initio* MO calculations.³²⁻³⁸

In some cases the coordinated olefin can rotate about the metal-olefin bond axis. A barrier of about 60 kJ mol^{-1} has been calculated theoretically for changing from in-plane coordination to perpendicular coordination in d^8 and d^{10} olefin complexes,^{21,36-38} this value being in reasonable agreement with the experimental value for the olefin rotation barrier.^{39,40}

As the back bonding from the metal to the olefin increases, the C=C bond is weakened and approaches a single bond, as can be seen in tetracyanoethylene (TCNE) complexes. In addition, the originally planar olefin becomes nonplanar, with the substituents bending away from the metal atom and other ligands. In extreme cases the carbon atoms bound to the metal approach tetrahedral sp^3 hybridization, as established by the X-ray structural determination.²⁷ The bond can be thus regarded as a metal-containing cyclic compound called a metallacycle:



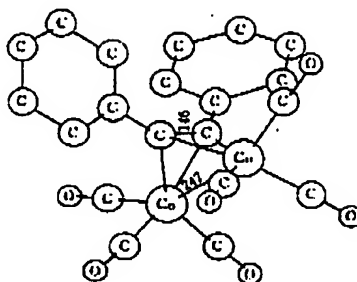
In going from side-on coordination to a metallacycle formation, the metal may be regarded as being oxidized by two units. However, as a convention, we regard the sideways bonded molecules as neutral ligands that do not alter the formal oxidation state of the metal, since the transition from (a) to (b) is a question of degree, with a smooth gradation from one description to another, and there is no stepwise change of the formal oxidation state.

(6) π Bonding with Acetylenes

Since acetylene has two mutually orthogonal orbitals, it is capable of bonding to two metal atoms through the π orbitals.^{41,42} Figure 3.11 shows the molecu-

COMPLEXES WITH METAL-CARBON π BONDS

61



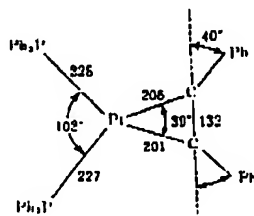
3-13

FIGURE 3.11. The molecular structure of (diphenylacetylene)hexacarbonyldicobalt. Numbers are in picometers. (Reprinted with permission from W. G. Sly, *J. Am. Chem. Soc.*, **81**, 18 (1959). Copyright 1976 American Chemical Society.)

lar structure of an acetylene complex, $(C_6H_5C\equiv CC_6H_5)Co_2(CO)_6$ (3-13), where diphenylacetylene is bound to two cobalt atoms.⁴³ The two carbon atoms of the acetylene molecule have a distorted tetrahedral configuration, with the phenyl rings bending away from the cobalt atoms.

The acetylene molecule need not always coordinate with two metal atoms and can bond to a single metal atom using only one pair of π electrons in the same way as do olefins. Figure 3.12 shows the molecular structure of a diphenylacetylene complex of this type (3-14).⁴⁴

In this complex two phosphorus atoms of the triphenylphosphine ligands, the platinum atom, and two carbon atoms of the acetylene molecule are in a plane with the two phenyl groups bending away from platinum. The $C\equiv C$ bond length is lengthened from 119 pm of the original, uncoordinated diphenylacetylene to 132 pm, which is close to the normal $C=C$ double bond. The $C\equiv C$ stretching frequency is also greatly lowered, to 1750 cm^{-1} , from that of free diphenylacetylene, at 2223 cm^{-1} . For acetylene complexes of earlier transition metal complexes, however, acetylene-metal interaction utilizing the two orthogonal sets of π and π^* orbitals involving four-electron donation has been noted.^{21,42}



3-14

FIGURE 3.12. Molecular structure of bis(triphenylphosphine)diphenylacetyleneplatinum(0). (From J. O. Glanville et al., *J. Organometal. Chem.*, **7**, 7 (1967), with permission.)